

We claim:

1. A winding machine (1), essentially consisting of a frame (2), this frame comprising at least two spindles (6, 7) fastened to a barrel (5), the said spindles being, on the one hand, designed to support at least one cake, and, on the other hand movable, in rotation about a first axis substantially perpendicular to the diameter of the cake, and at least one positioning and guidance device (8) designed to position and guide at least one thread on the rotating spindles (6, 7), the said barrel (5) being mounted movably in rotation with respect to the frame (2) along a third axis of rotation substantially parallel to the first axis, characterized in that the spindles (6, 7) are mounted so as to be movable linearly along the first axis of rotation, or in that the frame (2) cooperates with the barrel (5) by means of an indexing device which makes it possible to control the position of the said barrel (5) with respect to the said frame (2).

2. The winding machine (1) as claimed in claim 1, characterized in that the positioning and guidance device (8) consists essentially of at least one helix mounted movably in rotation about a second axis, substantially parallel to the said first axis.

3. The winding machine (1) as claimed in claim 1, characterized in that the positioning and guidance device (8) consists essentially of at least one wheel provided with at least one groove, this groove being designed to position and guide at least one thread, the said wheel being movable in rotation about a second axis substantially parallel to the first axis.

35 4. The winding machine (1) as claimed in claim 1, characterized in that the positioning and guidance device (8) consists essentially of at least one traveller, the said traveller being designed to

position and guide at least one thread and to be displaced linearly along a second axis substantially parallel to the first axis.

5    5. The winding machine (1) as claimed in claim 1, characterized in that the indexing device is designed to modify continuously the angular position of the barrel (5) with respect to the frame (2) as a function of the variation in the outside diameter of the cake, 10 so as to keep the path of the thread constant between its exit point from the positioning and guidance device (8) and its contact point on the periphery of the cake.

15    6. The winding machine (1) as claimed in one of claims 1 to 5, characterized in that the spindle (6, 7) is actuated in rotation by means of a kinematic chain comprising a motor incorporated in the said spindle.

20    7. The winding machine (1) as claimed in one of claims 1 to 6, characterized in that the winding machine (1) comprises a device for driving the thread or thread drawer (9) consisting essentially of at least two motor-driven rollers, the drawing device (9) being fastened to the frame (2) of the said winding machine 25 (1).

30    8. The winding machine (1) as claimed in one of claims 1 to 7, characterized in that the winding machine (1) comprises a straight ejector (11) designed to position the threads at the end of the spindle (6, 7).

35    9. The winding machine (1) as claimed in one of claims 1 to 8, characterized in that the winding machine (1) comprises a thread retraction device (10) designed to grasp and displace the threads between a first position, in which the threads are in engagement with the device (8) for the positioning and guidance of the threads, and a second position, in which the

threads are retracted from the said positioning and guidance device (8).

10. The winding machine (1) as claimed in one of  
5 claims 1 to 9, characterized in that the spindle (6, 7)  
and its drive motor are integral with a linear  
actuator, the said actuator being designed to ensure  
the to-and-fro movement of the said spindle (6, 7).

10 11. The winding machine (1) as claimed in one of  
claims 1 to 10, characterized in that the winding  
machine (1) comprises a control and command device  
making it possible, in particular, to ensure a  
regulation of speed and/or of position between the  
15 primary stroke movement of the positioning and guidance  
device (8) and the secondary stroke movement of at  
least one of the spindles (6, 7).